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Waste Minimization Awareness Plan

Produced by the Risk Reduction and Environmental Stewardship Remediation Program

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List of Acronyms and Abbreviations

DOE	US Department of Energy
DOE-EM	US Department of Energy Office of Environmental Management
EPA	US Environmental Protection Agency
ESH-ID	Environment, Safety, and Health Identification (process)
FY	fiscal year
Laboratory	Los Alamos National Laboratory
LANL	Los Alamos National Laboratory
LLMW	low-level mixed waste
LLW	low-level waste
MDA	material disposal area
NMED	New Mexico Environment Department
PRS	potential release site
RCRA	Resource Conservation and Recovery Act
RRES	Risk Reduction and Environmental Stewardship (Division)
RRES-PP	Risk Reduction and Environmental Stewardship-Pollution Prevention Program
RRES-R	Risk Reduction and Environmental Stewardship-Remediation Program
TA	technical area
TSCA	Toxic Substances Control Act
VCM	voluntary corrective measure
WMin/PP	waste minimization and pollution prevention

Los Alamos National Laboratory
Risk Reduction and Environmental Stewardship Remediation Program

WASTE MINIMIZATION AWARENESS PLAN

1.0 INTRODUCTION

Waste minimization is an inherent goal within all the operating procedures of the Los Alamos National Laboratory (the Laboratory). The US Department of Energy (DOE) and the Laboratory are required to annually submit a waste minimization plan to the New Mexico Environment Department (NMED) in accordance with the Laboratory's Hazardous Waste Facility Permit. This document represents the waste minimization and pollution prevention (WMin/PP) awareness plan for the Laboratory's Risk Reduction and Environmental Stewardship Remediation (RRES-R) Program.

This plan supports the RRES-R Program's WMin/PP goals and describes its program to incorporate waste reduction practices into RRES-R activities and procedures. The plan was prepared by the RRES-R Program Office, formerly the Environmental Restoration Project, pursuant to the requirements of Module VIII, Section B.1 of the Laboratory's Hazardous Waste Facility Permit (NM0890010515-1). This plan is specific to the RRES-R Program and should be considered a companion document to the Laboratory's May 1997 site-wide plan, "Site Pollution Prevention Plan for Los Alamos National Laboratory," and the annual certification document, "Los Alamos National Laboratory 2001 Pollution Prevention Roadmap" (LANL 2001, 73683).

1.1 Background

The mission of the Laboratory's RRES-R Program is to investigate and remediate potential release sites as necessary to protect human health and the environment. In completing this mission, RRES-R activities may generate large volumes of waste, some of which may require special handling, treatment, storage, and disposal. Because the RRES-R Program is tasked with investigating and conducting corrective action, as necessary, at historically contaminated sites within the Laboratory, source reduction and material substitution are difficult to implement. However, the RRES-R Program generates waste in the conduct of site cleanups and, thus, is faced with the responsibility and the challenge of minimizing the amounts of waste that will require subsequent management or disposal. Minimization is necessary because of the high cost of waste management; the limited capacity for on-site or off-site waste treatment, storage, or disposal; and the desire to minimize the associated liability.

In 1990, Congress passed the Pollution Prevention Act, which changed the focus of environmental policy from "end-of-pipe" regulation to encouraging source reduction or minimizing waste generation. Under the provisions of the Pollution Prevention Act and other institutional requirements for treatment, storage, and disposal of wastes, all waste generators must certify that they have a waste minimization program in place. The elements of this program are further defined in the May 1993 US Environmental Protection Agency (EPA) interim final guidance, 58 F.R. 102, "Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program." The program guidance lists what EPA considers the minimum level of infrastructure and effort that must be expended to have an acceptable program. This includes top management support, process evaluation, technology exchange, waste minimization employee training, and waste generation tracking and projections.

The DOE Office of the Secretary also requires a pollution prevention program as outlined in the 1996 Pollution Prevention Program Plan (DOE/S-0118). The DOE plan has specific program requirements for every waste generator, including evaluating waste minimization options as early in the planning process

as possible. The DOE plan also places responsibility for WMin/PP implementation with the waste-generating program. In a November 12, 1999, memorandum, the Secretary of Energy set an annual 10% reduction goal for all wastes generated from facility decommissioning and site stabilization activities (Richardson 1999, 73681). The Laboratory's approach to achieving the 10% reduction goal is addressed later in this document.

1.2 Purpose and Scope

The purpose of this plan is to document the RRES-R Program's approach for minimizing the wastes it generates. This plan discusses the goals, methods, and activities that will be routinely employed to prevent or reduce waste generation in fiscal year 2003 (FY03), and it reports FY02 waste generation quantities and significant waste minimization accomplishments for FY02. This plan also discusses the RRES-R Program Manager's commitment to WMin/PP, provides a discussion of specific program elements of the RRES-R WMin/PP Program, and presents the barriers to implementation of further significant reductions.

This plan is designed to fulfill the waste minimization requirements of RCRA/Hazardous and Solid Waste Amendments, as implemented in Module VIII, Section B.1, of the Laboratory's Hazardous Waste Facility Permit.

This plan addresses all waste classifications generated by the RRES-R Program during the course of planning and conducting the investigation and remediation of environmental media funded by the DOE Office of Environmental Management (DOE-EM). Wastes generated by RRES-R include "primary" and "secondary" waste streams. Primary waste consists of generated contaminated material or environmental media that was present as a result of past DOE activities, before any containment and restoration activities. It includes contaminated building debris or soil from investigations and remedial activities. Secondary waste streams consist of materials that were used in the investigative or remedial process and may include investigative-derived waste (e.g., personal protective equipment, sampling waste, drill cuttings); treatment residues; wastes resulting from storage or handling operations; and additives used to stabilize waste. The RRES-R Program may generate the following waste classifications: radioactive low-level waste (LLW); low-level mixed waste (LLMW); transuranic radioactive waste; chemical wastes (which include Resource Conservation and Recovery Act [RCRA] hazardous, Toxic Substances Control Act [TSCA], and New Mexico Special wastes); and/or solid waste.

The scope of a WMin/PP effort for an individual RRES-R project will be dependent on the primary and secondary wastes anticipated to be generated and the feasibility of waste reduction for those waste streams.

1.3 Requirements of the Operating Permit

Module VIII, Section B.1, of the Laboratory's Hazardous Waste Facility Permit requires that a waste minimization program be in place and that a certified plan be submitted annually to the administrative authority. The specific requirements of the permit are listed in Table 1.3-1 along with the corresponding section of the plan that addresses the requirement.

Table 1.3-1
Los Alamos National Laboratory Hazardous Waste Facility Permit, Module VIII, Section B.1

Permit Requirement	Topic	Refer to Report Section
Section B.1.(a)(1)	Policy Statement	Section 2.0
Section B.1.(a)(2)	Employee Training	Section 6.3
Section B.1.(a)(2)	Incentives	Section 6.10
Section B.1.(a)(3)	Past and Planned Source Reduction and Recycling	Section 5.4
Section B.1.(a)(4)	Itemized Capital Expenditures	Section 5.4
Section B.1.(a)(5)	Barriers to Implementation	Section 7.0
Section B.1.(a)(6)	Sources of Information	Section 6.4
Section B.1.(a)(7)	Investigation of Additional WMin Efforts	Section 6.2
Section B.1.(a)(8)	Utilization of Hazardous Materials	Section 5.2
Section B.1.(a)(9)	Justification of Waste Generation	Section 5.0
Section B.1.(a)(10)(a)	Site Lead Inventory Program	Section 6.11
Section B.1.(a)(10)(b)	Steel for Lead Substitution Program	Section 6.11
Section B.1.(a)(10)(c)	Lead Shielding Coating Program	Section 6.11
Section B.1.(a)(10)(d)	Lead Decontamination Program	Section 6.6
Section B.1.(a)(10)(e)	Scintillation Cocktail Substitution Program	Section 5.2
Section B.1.(a)(10)(f)	Radioactive Waste Segregation Program	Section 6.6

2.0 RRES-R PROGRAM MANAGER POLICY STATEMENT AND MANAGEMENT COMMITMENT

The Laboratory's program manager for the RRES-R Program and all other RRES-R Program personnel are committed to preventing or reducing the generation of waste from RRES-R Program activities, as much as is technically and economically feasible and consistent with the RRES-R Program mission.

The Laboratory's support for pollution prevention and waste minimization programs is documented in the Laboratory waste management requirements. The RRES-R Program additionally mandates waste minimization techniques in several of its standard operating procedures. In addition, the RRES Division Pollution Prevention Program (RRES-PP) is tasked by DOE and the Laboratory to champion and implement an aggressive waste minimization and environmental stewardship program for the entire Laboratory.

Another management program in place at the Laboratory is the Environment, Safety, and Health Identification (ESH-ID) process, which is a tool designed to assist Laboratory personnel in identifying and managing, and complying with, Environment, Safety, and Health Laboratory implementation requirements, which may impact project planning and execution. This process incorporates the evaluation of potential waste-generating activities before project startup and includes review by a waste minimization/pollution prevention subject-matter expert.

The RRES-R Program fully supports the Laboratory’s and RRES Division’s written WMin/PP policies, programs, and commitments. The RRES-R Program will support the goal of waste reduction by giving preference to source reduction, improved segregation and characterization, and environmentally sound recycling practices regarding waste treatment and disposal techniques, to the degree determined to be

economically practicable. Evidence of the RRES-R Program commitment is demonstrated by this plan, as well as by the documentation of past waste reduction efforts within the RRES-R Program (formerly the Environmental Restoration Project) (Section 5.4). The RRES-R Program will allocate sufficient resources to pursue the goals and approaches established by this plan and will coordinate with RRES-PP Program, as necessary.

3.0 ORGANIZATIONAL STRUCTURE AND STAFF RESPONSIBILITIES

The RRES-R Program is part of the RRES Division at the Laboratory and is subject to all Laboratory and RRES Division policies and requirements. The structure of the RRES-R Program is currently under reorganization. As of November 2002, the program is operating under the organizational structure shown in Figure 3.0-1. Continued refinement of this structure is anticipated.

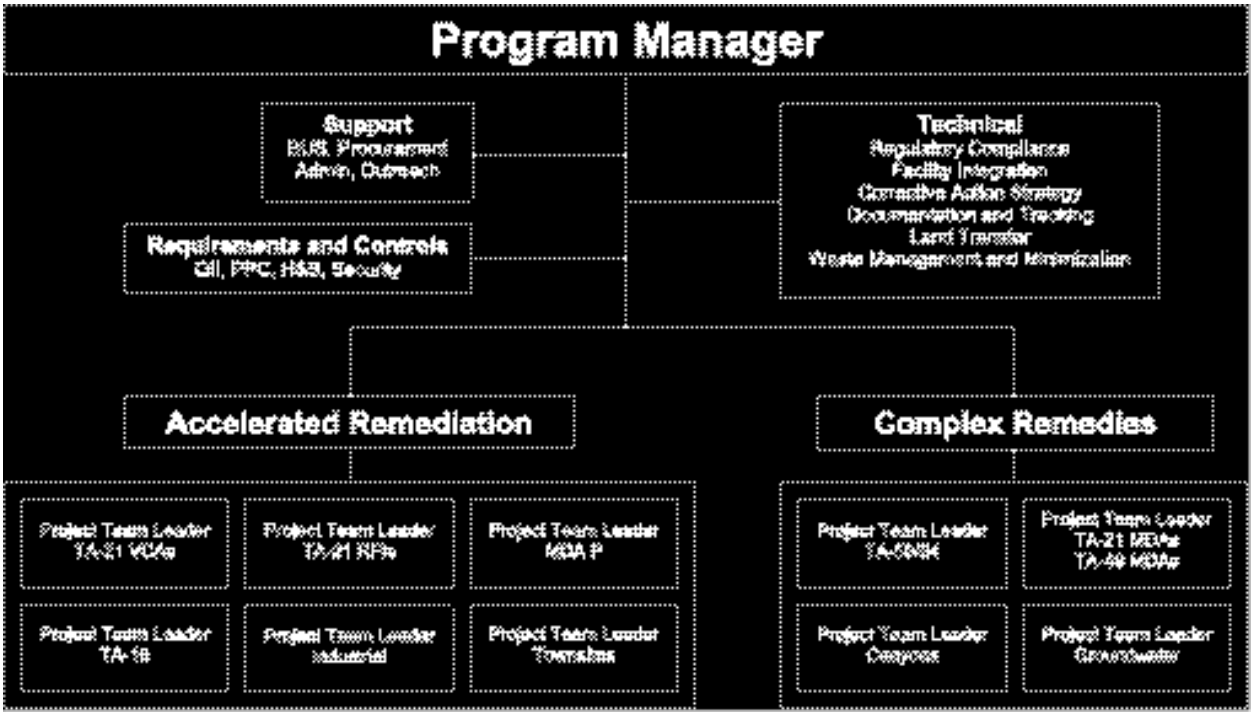

Figure 3.0-1. RRES-R program interim organization chart

The organizational structure for developing and implementing WMin/PP programs is outlined below:

- The Laboratory director and the deputy director for operations have oversight responsibilities and provide annual review of the Laboratory-wide WMin/PP Program goals and performance.
- The RRES Division has primary responsibility for the Laboratory-wide WMin/PP Program, including the RRES-R Program.
- The RRES-PP Program has been tasked by the RRES Division to develop and manage the Laboratory-wide WMin/PP and environmental stewardship program. The RRES-PP Program provides oversight for WMin/PP implementation; a base of technical knowledge and resources for

WMin/PP practices; assistance with identifying waste generation trends and WMin/PP opportunities; recommendations for WMin/PP solutions and applications; support in tracking and reporting waste generation trends and WMin/PP successes and lessons learned; assistance in preparing funding applications and proposals for WMin/PP projects; and assistance in overcoming WMin/PP implementation barriers.

- The program manager for the RRES-R Program has primary responsibility for developing and implementing WMin/PP programs and strategies for all RRES-R projects that result in waste generation, as described in this plan. The RRES-R Program must allocate sufficient resources to attain the goals and approaches identified in this plan. The RRES-R Program is responsible for establishing and submitting an annual WMin/PP plan to the administrative authority, establishing WMin/PP goals and performance measures, and coordinating with the RRES-PP Program to implement WMin/PP activities and to report success stories.
- The RRES-R Program Office is the focal point for planning and implementing waste minimization activities and reporting waste minimization successes and lessons learned for the RRES-R Program.
- RRES-R Program project leaders, who report to the program manager, are responsible for identifying and incorporating WMin/PP practices into project plans and field activities, as much as technically and economically feasible.
- The RRES-R Program waste management and minimization coordinator is responsible for coordination of waste minimization activities, coordinating proposals for waste minimization implementation projects, advising project leaders on Wmin/PP technologies and techniques, recommending RRES-R Program-wide policy, and compiling waste generation and minimization data.

4.0 GOALS AND PERFORMANCE MEASURES

The DOE Headquarters established an annual DOE complex-wide 10% reduction goal for environmental restoration activities based upon overall waste projections. Additionally, the University of California FY03 contract performance measures include the same 10% waste reduction goal for cleanup/stabilization activities.

The RRES-R FY03 WMin/PP approach will focus on

- integrating waste minimization principles into the remedial planning process;
- recycling and reusing materials;
- utilizing material substitution as appropriate;
- developing subcontractor waste minimization incentives through contract specifications;
- dedicating waste minimization resources to assist with large remedial actions; and
- tracking, projecting, and analyzing waste data to improve waste management economies of scale.

Figure 4.0-1 shows the environmental hierarchy for RRES-R Program wastes. Although source reduction is preferred, the RRES-R WMin/PP approach recognizes there may be limited opportunity for source reduction of primary wastes because the RRES-R Program is tasked to investigate and conduct corrective actions, as necessary, at historically contaminated sites within the Laboratory, and potential

environmental concerns may require removal of contaminated material. When appropriate, source reduction of primary wastes will be accomplished through the application of risk-based cleanup criteria and associated land-use scenarios, the consideration of in situ or nonintrusive remediation technologies during project planning and negotiation stages, and improved characterization and segregation during the execution of field activities. Source reduction of secondary wastes will be accomplished through proper planning; improved housekeeping, segregation, and characterization; and application of WMin/PP criteria during technology selection, design, and construction activities. Recycling and reuse practices will be considered for all primary and secondary wastes. Volume reduction, including size reduction, compaction, and optimal packaging, will be considered for all primary and secondary wastes for which generation cannot be avoided and which cannot be recycled.

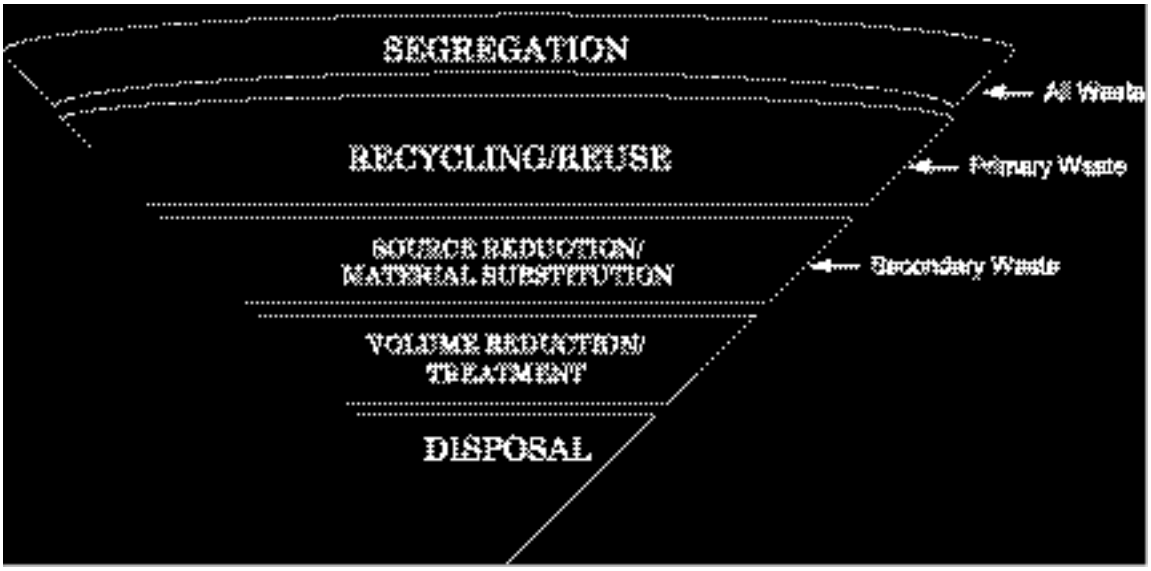

Figure 4.0-1. Environmental management hierarchy within the RRES-R Program

The WMin/PP approaches outlined above are consistent with the waste reduction priorities established by the Laboratory's sitewide waste minimization plan, which recognizes the severe limitations of on-site disposal capacity for radioactive LLW and on-site storage capacity for LLMW. In addition, the approach was adopted to address the variable and nonrecurring nature of wastes coming from RRES-R activities.

5.0 SITUATION ANALYSIS

The FY02 activities that resulted in waste generation included remedial actions and site investigations. These types of activities will continue throughout the life of the Laboratory's RRES-R Program. It should be noted that the majority of FY02 waste generation was the result of RCRA clean closure activities at Material Disposal Area (MDA) P, the interim action at the TA-53 northern surface impoundments, and cleanup activities at Acid Canyon.

The FY03 planned activities include a voluntary corrective measure (VCM) at an outfall area [Potential Release Site (PRS) 21-011(k)], additional deep groundwater characterization and intermediate well installation, and other site investigations and corrective action projects.

5.1 Applicable Statutory, Regulatory, and Institutional Requirements

The Laboratory's RRES-R Program is subject to many environmental regulations. The key drivers for the WMin/PP program are listed below. A complete description of these regulations may be found in the Laboratory's Waste Minimization Awareness Plan or the "Waste Minimization and Pollution Prevention Regulations and Orders, Requirements and Identification List."

Federal Statutes and Executive Orders

- Resource Conservation and Recovery Act
- Pollution Prevention Act
- Executive Order 12873 — Federal Acquisition, Recycling, and Waste Prevention
- Executive Order 12856 — Federal Compliance with Right-to-Know Laws and Pollution Prevention
- Executive Order 13148 — Greening the Government Through Leadership in Environmental Management

Federal Regulations

- Code of Federal Regulations, Title 40, Part 262 _ Standards Applicable to Generators of Hazardous Waste
- Code of Federal Regulations, Title 40, Part 264 _ Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- Code of Federal Regulations, Title 40, Part 270 — EPA Administered Permit Programs: The Hazardous Waste Permit Program

State of New Mexico Statutes

- New Mexico Hazardous Waste Act

State of New Mexico Regulations

- New Mexico Solid Waste Management Regulations, Title 20, Chapter 9, Part 1, New Mexico Administrative Code
- New Mexico Hazardous Waste Management Regulations, Title 20, Chapter 4, Part 1, New Mexico Administrative Code

DOE Policy

- DOE Order 5400.1, "General Environmental Protection Program"
- DOE Order 5400.3, "Hazardous and Radioactive Mixed Waste Program"
- DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
- DOE Order 435.1, "Radioactive Waste Management"
- Secretary of Energy Notice 37-92, "Waste Minimization Policy Statement"
- DOE Pollution Prevention Program Plan, 1996

Los Alamos National Laboratory Directives and Policies

- Los Alamos National Laboratory 2001 Pollution Prevention Roadmap, LA-UR-01-6634, December 2001
- Laboratory waste management requirements

5.2 Justification for the Use of Hazardous Materials

RRES-R Program activities currently introduce only small amounts of hazardous materials into field and support operations. During the past years, most use of hazardous materials has been substituted with nonhazardous alternatives in an effort to reduce the generation of secondary hazardous or mixed waste. These efforts include the following:

- Decontamination Solvents — The use of hazardous solvents has been eliminated in the RRES-R Program.
- Scintillation Cocktails — The routine use of scintillation cocktail media that results in a mixed waste has been discontinued at the Laboratory.
- Analytical Processes — Some samples collected for site characterization may require the use of hazardous chemicals evaluated by EPA, private companies, and universities for potential alternative processes and material substitution. The use of hazardous chemicals for sample preservation is currently viewed as necessary.

5.3 FY02 Waste Generation Summary

The RRES-R Program FY02 waste generation and waste minimization summary is listed in Table 5.3-1. Waste projections and reduction goals for FY03 are listed in Table 5.3-2.

Table 5.3-1
Fiscal Year 2002 Waste Generation Summary
(October 1, 2001, Through September 30, 2002)

Waste Type	FY02 Planned Waste Volume (m^3) from RRES-R and Stabilization Activities[a]	Volume (m^3) of Waste Targeted for Reduction/ Recycle to Achieve Goal	FY02 Waste Generation Volume (m^3)[b]
Solid – Transuranic Radioactive	0.8	0	0
Solid – Mixed Low-Level Radioactive	0	0	0
Solid – Low-Level Radioactive	1640	164	4815.6
Solid – Hazardous[c]	3.8	0.3	998.2
Solid – Sanitary[d]	783	75	48

[a] Based on January 2002 Integrated Planning, Accountability, and Budgeting data.

[b] Includes wastes generated by DOE-EM activities; and excludes wastes generated by fire recovery activities and flood preparation projects.

[c] Includes RCRA hazardous, TSCA, and New Mexico Special wastes.

[d] Nonhazardous municipal wastes sent to County of Los Alamos Landfill.

Table 5.3-2
Fiscal Year 2003 Projected Waste Generation
(October 1, 2002, Through September 30, 2003)

Waste Type	FY03 Projected Waste Volume (m^3) from RRES-R and Stabilization Activities	Volume (m^3) of Waste Targeted for Reduction/ Recycle to Achieve Goal	Percent Reduction Goal
Solid – Transuranic Radioactive	0	0	10%
Solid – Mixed Low-Level Radioactive	0.8	0	
Solid – Low-Level Radioactive	1926	192	
Solid – Hazardous[a]	3.8	0	
Solid – Sanitary[b]	89	8.9	

[a] Includes RCRA hazardous, TSCA, and New Mexico Special wastes.

[b] Nonhazardous municipal wastes to be sent to County of Los Alamos Landfill.

5.4 Waste Minimization Accomplishments during FY02

WMin/PP was an integral part of the FY02 RRES-R planning activities and field projects through recycling, reuse, contamination avoidance, risk-based cleanup strategies, and many other practices. Waste reduction benefits are typically difficult to track and quantify because the data to measure the amount of waste reduced (as a direct result of a WMin/PP activity) are often not available and are not easily extrapolated. In addition, many waste minimization practices employed during previous years are incorporated into standard operating procedures and no longer reported. Operating expenses of approximately $50,000 are provided annually to evaluate best management approaches, source reduction, and recycling options.

Pollution prevention capital projects not funded from project funds may also be funded through a Laboratory-wide “Waste Minimization/Waste Generation Set-Aside Tax” system. This system taxes waste generators according to the volumes and toxicity of wastes generated. The RRES-R Program has previously submitted Return on Investment proposals for WMin/PP projects that are eligible for funding through this program. The Laboratory annually funds over $1M in pollution prevention projects through this program. A list of the projects funded in FY02 can be found at http://emeso.lanl.gov/eso_projects/set_aside/gsaf.html.

High-volume waste streams resulting from RRES-R activities include contaminated soil and demolition debris such as metal and concrete. The WMin/PP techniques used in FY02 to reduce these high-volume waste streams led to the following accomplishments:

- The RRES-R Program’s Field Support Facility, working with Johnson Controls Northern New Mexico, identified a recycling pathway for plastic buckets that contained drilling completion materials. The completion materials are not available in larger containers and large quantities of used buckets were being generated on a routine basis. Field Support Facility personnel inquired about recycling options for the buckets rather than disposing of them at the landfill. The plastic buckets are now sent to Tewa Industries in Albuquerque and are used to make plasphalt, a type of asphalt that incorporates plastic into asphalt for road materials. It is estimated that 400 to 800 buckets are recycled per well. The RRES-R Program recycles approximately 2000 to 4000 buckets per year.

- The South Fork of Acid Canyon Interim Action Team achieved waste minimization goals by prescreening soil for removal using a vacuum remediation technology to remove only the pre-screened soil from the South Fork of Acid Canyon channel. The soil was deposited in vacuum-tight rolloff bins and transported to Technical Area (TA)-54, Area G. Additional waste minimization was achieved by using dedicated worker coveralls and leather work boots instead of using disposable coveralls and booties. The dedicated coveralls and work boots were left onsite during remediation activities and disposed of at the end of the project. The vacuum remediation equipment and the time of year chosen for field activities minimized air and water pollution. Using the vacuum remediation technology instead of conventional excavation using heavy equipment minimized air pollution from dust-producing activities. The vacuum remediation technology removed soil and reduced dust emissions during remediation activities, thereby reducing air pollution in the work area and the surrounding residential areas. Also access roads and high traffic areas were wetted down as needed to provide dust suppression. Conducting field activities during the dry season so that no natural water flow was present in the channel during work activities minimized water pollution. Disturbed soil areas were covered with plastic sheeting until remediated to prevent runoff in the event of rain. Site restoration activities included mulching with straw and preventing surface erosion using straw wattles. Straw bales and straw wattles are recycled vegetative materials.
- During the interim action at the TA-53 northern impoundments, the field team performed a discrete excavation of the sludge and liner at the northern impoundments [PRS 53-002(a)] in order to ensure that only the contaminated material was removed. This resulted in additional time in the field, but ensured that only contaminated material was excavated, thereby reducing the total waste volume generated.
- At TA-48, hydrocarbon-contaminated soil was segregated from clean soil by performing a discrete excavation using direct photoionization detector measurements from the backhoe bucket to guide soil removal.
- For the interim action at PRS 21-011(k), the RRES-R Program requested a “no longer contained in” determination so that excavated sediments containing trace amounts of organic chemicals will not require disposal as low-level mixed wastes.

6.0 WASTE MINIMIZATION PROGRAM ELEMENTS

Listed below are the Laboratory’s RRES-R Program waste minimization program elements for FY03. Several of the elements are currently in place; however, several are in the planning stages. The elements will be implemented if economically and technically feasible.

6.1 WMin Coordinator

The WMin/PP coordinator will have a primary role in FY03 for developing and implementing programmatic elements of the RRES-R WMin/PP Program by conducting the following activities:

- Improve WMin/PP awareness and information exchange within the RRES-R Program.
- Provide technical reviews and WMin/PP input for RRES-R documents and procedures, such as corrective measures studies, sampling and analysis plans, or other project work plans and provide working examples of "model" documents that incorporate WMin/PP elements.

- Provide technical assistance and consistency among RRES-R projects to formalize standard approaches for WMin/PP in RRES-R Program plans and procedures and institutionalize the use of design reviews, WMin/PP checklists, or value engineering for WMin/PP applications.
- Assist in developing WMin/PP language for RRES-R subcontractor documents and project specifications, thus providing incentives and measurable goals for waste reduction.
- Pilot test or demonstrate site-specific waste reduction activities with a high potential for immediate return on investment.

The WMin coordinator(s) will provide WMin/PP tools and practices to the RRES-R Program. The specific application and waste reduction potential of a tool will be dependent on the specific project and will be left to the judgment of the individual project leaders. The common Wmin/PP tools for use in the RRES-R Program are summarized in the list that follows.

- WMin/PP tools for the negotiations and planning phases
    - _ Negotiate with regulators to recognize and implement WMin/PP where appropriate
    - _ Write WMin/PP into RRES-R program documents
    - _ Include WMin/PP in budgets and contracts
    - _ Integrate WMin/PP into construction of engineered structures and best management practices
    - _ Train RRES-R personnel on WMin/PP and build WMin/PP awareness
- WMin/PP tools for the assessment phase
    - _ Conduct efficient sample management and analysis
    - _ Consider alternative sampling techniques
    - _ Consider alternative drilling techniques
    - _ Segregate materials and waste through field screening
    - _ Use site control techniques
    - _ Use bulk waste packaging
    - _ Train RRES-R personnel on WMin/PP and build WMin/PP awareness
- WMin/PP tools for the alternative evaluation and selection phase
    - _ Identify WMin/PP as a key criterion during treatment selection
    - _ Incorporate WMin/PP in key decision-making documents
    - _ Conduct treatability studies that support WMin/PP
    - _ Train RRES-R personnel on WMin/PP and build WMin/PP awareness
- WMin/PP tools for the implementation phase
    - _ Scour and decontaminate building materials
    - _ Recycle and reuse materials from decommissioning activities
    - _ Prevent contamination migration

- _ Dedicate a person on each RRES-R project to promote WMin/PP (e.g., a WMin coordinator)
- _ Reuse equipment
- _ Train RRES-R personnel on WMin/PP and build WMin/PP awareness

6.2 WMin Planning

WMin/PP is best integrated during the project planning (including design and engineering) phase. WMin/PP strategies incorporated during the planning (and negotiations) phases are some of the few opportunities for "source reduction" because they have the potential to avoid or reduce the generation of contaminated soil and building debris, which represent a significant waste volume within the RRES-R Program. Well-defined agreements (with regulators and stakeholders) regarding land-use scenarios, cleanup performance standards, and risk and pathway scenarios are highly effective in avoiding or reducing these primary wastes (e.g., soil, building debris) and secondary wastes.

The ESH-ID process provides a tool in the planning and design phase to assist Laboratory personnel in identifying and managing environment, safety, and health Laboratory implementation requirements having the potential to impact a project. This process incorporates evaluation of potential waste-generating activities before project startup and includes review by a waste minimization/pollution prevention subject-matter expert.

6.3 Employee Training and Awareness

Waste minimization implementation is most effective when all employees consider WMin/PP part of their job responsibilities. To accomplish this, a planned approach to building waste minimization awareness has been developed. The goals of the awareness program are to

- improve recognition among employees that WMin/PP practices apply to RRES-R activities;
- educate employees about successful implementation at the Laboratory and within DOE; and
- improve documentation of WMin/PP accomplishments.

In addition to awareness activities, during FY02 the Laboratory conducted WMin/PP training for all RRES-R Program and subcontractor project managers, project leaders, field team leaders, and waste management coordinators. The training was focused on WMin/PP opportunities for RRES-R fieldwork and educating all personnel on the WMin/PP tools available to the RRES-R Program.

In addition to the above formal training, all RRES-R waste management coordinators are required to attend quarterly meetings as ongoing training in issues important to performing the duties of a waste management coordinator, including periodic updates from the RRES-PP Program.

Laboratory managers are required to attend integrated safety management training, which addresses management of all environment, safety, and health issues, including waste minimization and pollution prevention awareness.

6.4 Information and Technology Introduction

The introduction of new technologies for WMin/PP and waste management approaches is important to minimizing wastes. To support technology exchange, the waste minimization coordinator is available to

research technologies or WMin/PP tools for RRES-R project leaders, as necessary to obtain information on technical or economic feasibility. Some sources for documents include

- DOE, Remedial Action Project Information Center, Oak Ridge, Tennessee
- DOE, EPIC (the DOE Pollution Prevention Information Clearinghouse), Pacific Northwest Labs, Richland, Washington
- EPA, Superfund Innovative Technology Evaluation (SITE) Database
- DOE, Technology Information Exchanges Conferences and Abstract Summaries
- EPA, Pollution Prevention Homepage Web Site
- EPA, Pollution Prevention Clearing House Web Site
- EPA, Envirosense Web Site
- EPA, National Center for Environmental Publications Web Site
- DOE, Environmental Web Site
- University of Texas El Paso, Southwest Pollution Prevention Center Web Site
- US Navy, Joint Service Pollution Prevention Technical Library Web Site
- State of Kentucky, Kentucky Pollution Prevention Center Web Site
- DOE Oak Ridge National Laboratory, ORNL Pollution Prevention Web Site

6.5 Tracking and Reporting

The routine collection of data regarding waste minimization was established in FY96. Project managers are asked to provide documentation of accomplishments as they occur, with a formal quarterly data consolidation effort.

6.6 Sort, Decontaminate, and Segregate

This task is currently implemented and is designed to sort and decontaminate recyclable/recoverable radioactive LLW materials from decommissioning operations for the purpose of eliminating their disposal at TA-54 as radioactive LLW. Typical sorting practices include collection of all metal debris (including steel, lead, etc.) in separate boxes destined for shipment to a decontamination facility or commercial smelter for metals recovery. Decontamination work will involve the removal of surface radioactive contamination on equipment to allow for its reuse either at Los Alamos or other DOE facilities.

Additionally, many sites containing radioactively contaminated heterogeneous materials will place emphasis on proper segregation at the source to attain the maximum recycling and waste classification advantages.

6.7 Compaction

The RRES-R Program plans to improve this process by using the compaction unit at TA-54 on suitable waste before final disposal. The compactor at TA-54 has a higher compaction yield than past equipment.

6.8 Survey and Release

Past practices have conservatively classified nonindigenous investigation-derived waste (e.g. personal protective equipment, sampling materials) as contaminated, based on association with contaminated areas. New policy within the Laboratory allows the RRES-R Program to develop procedures to survey and release these materials as nonradioactive. This will reduce the volume of radioactive LLW disposed of at Area G from RRES-R activities. Waste management coordinators will be trained in the Laboratory occupational radiation protection requirements.

6.9 Risk Assessment

Risk assessments are routinely conducted for RRES-R Program projects, as prescribed in the Laboratory's Installation Work Plan (LANL 1998, 62060). Risk assessments allow the RRES-R Program to plan remediation activities on the basis of the future risk to human health and the environment. Often the risk assessment may determine that it is adequately protective and appropriate or beneficial to leave the material in the ground, thus avoiding the generation of waste.

Properly designed land-use agreements and risk-based cleanup strategies can provide flexibility to select remedial actions (or other technical activities) that may avoid or reduce the need to excavate or conduct other actions that typically generate high volumes of remediation waste. This is one of the few opportunities available to the RRES-R Program for source reduction.

6.10 Incentives

The Laboratory's RRES-PP Program and DOE Headquarters sponsor annual pollution prevention awards programs. Both of these programs provide financial awards and recognition to personnel who implement pollution prevention projects.

The RRES-R Program participates in the Laboratory-wide "Waste Minimization/Waste Generation Set-aside Tax" system. This system charges waste generators according to the volumes and toxicity of wastes generated. This financial burden is an incentive for waste generators to reduce waste generation to lower total project costs. The RRES-R Program has previously submitted Return on Investigation proposals for WMin/PP projects that are eligible for funding through this tax. The Laboratory annually funds over $1M in pollution prevention projects through this program.

6.11 Lead-Handling Procedures

The RRES-R Program does not routinely procure or use lead or handle excess lead. The inventory and decontamination of existing lead at the Laboratory has been conducted as part of a milestone of the Laboratory's Federal Facilities Compliance Act agreement and is outside the scope of the RRES-R Program.

RRES-R personnel will manage and minimize the amount of lead-contaminated waste using the following approaches.

- Projects will specify a preference to avoid the procurement or use of lead, when possible, giving preference to the use of steel in place of lead.
- Projects will specify the use of strippable or washable coatings for any lead materials that must be used and have the potential to become contaminated.

- Projects will plan for the decontamination of lead materials, when economically feasible, using blast grit, carbon dioxide blast (or other nondestructive blast), or chemical decontamination techniques. Preference will be given to decontamination techniques that minimize the generation of secondary waste (from the treatment process).
- Projects that handle noncontaminated lead waste as a primary waste from the removal action or decommissioning activity will make efforts to recover and redistribute the lead for use at the Laboratory or at another DOE facility.
- Projects will coordinate with the Laboratory's Solid Waste Operations Group for the appropriate handling and disposition of radioactively contaminated lead that cannot be decontaminated or redistributed.

6.12 Equipment Reuse

The reuse of equipment and materials (after proper decontamination to prevent cross contamination) such as plastic gloves, sampling scoops, plastic sheeting, and personal protective equipment will produce waste reduction and cost savings in FY03.

In addition, the Laboratory has initiated an equipment-exchange program, which identifies surplus or inactive equipment available for use. This not only eliminates the cost of purchasing the equipment, but it also delays the point at which the equipment is no longer needed and must be disposed.

7.0 BARRIERS TO WASTE MINIMIZATION IMPLEMENTATION

In some instances, regulatory requirements created situations where levels of waste minimization achieved fell below potentially achievable levels based on site conditions. Examples follow:

- At MDA P, 1680 cubic meters of steel was decontaminated, segregated, and prepared for shipment to a commercial steel-recycling facility. However, because of the DOE moratorium on release of metal from radiological controlled areas, this material was not shipped to a recycler.
- The RRES-R Program prepared a VCM plan for PRS 21-011(k) that called for stabilizing contaminated sediments in place. In order to minimize future long-term stewardship requirements associated with the stabilized sediments, DOE opted to change the VCM approach to excavation and disposal of the sediments. This revised approach will result in generation of larger volumes of waste during the VCM.
- A risk-based analysis of the Acid Canyon site indicated that contamination levels quantified through a RCRA facility investigation did not pose unacceptable risk to human health or the environment. However, DOE determined that the materials were to be removed resulting in several hundred cubic meters of additional waste disposal.
- Laboratory environmental requirements to protect wetlands, which result in continued National Pollutant Discharge Elimination System-permitted discharge of waters into canyons throughout the Laboratory, may result in additional transport of contaminants. Although this practice may result in greater remediation waste volumes in the future, it provides the benefit of protecting wildlife and wetlands.

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